Near-Real Time Satellite-Retrieved Cloud and Surface Properties for Weather and Aviation Safety Applications

Patrick Minnis, William L. Smith, Jr., Kristopher M. Bedka, Louis Nguyen
NASA Langley Research Center
Hampton, VA

Rabindra Palikonda, Gang Hong, Qing Z. Trepte, Thad Chee, Benjamin Scarino, Douglas A. Spangenberg, Szedung Sun-Mack, Cecilia Fleeger, J. Kirk Ayers, Fu-Lung Chang
SSAI
Hampton, VA

Patrick M. Heck
NOAA CIMMS, Madison, WI

Abstract
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Cloud properties determined from satellite imager radiances provide a valuable source of information for nowcasting and weather forecasting. In recent years, it has been shown that assimilation of cloud top temperature, optical depth, and total water path can increase the accuracies of weather analyses and forecasts. Aircraft icing conditions can be accurately diagnosed in near-real time (NRT) retrievals of cloud effective particle size, phase, and water path, providing valuable data for pilots. NRT retrievals of surface skin temperature can also be assimilated in numerical weather prediction models to provide more accurate representations of solar heating and longwave cooling at the surface, where convective initiation. These and other applications are being exploited more frequently as the value of NRT cloud data become recognized. At NASA Langley, cloud properties and surface skin temperature are being retrieved in near-real time globally from both geostationary (GEO) and low-earth orbiting (LEO) satellite imagers for weather model assimilation and nowcasting for hazards such as aircraft icing. Cloud data from GEO satellites over North America are disseminated through NCEP, while those data and global LEO and GEO retrievals are disseminated from a Langley website. This paper presents an overview of the various available datasets, provides examples of their application, and discusses the use of the various datasets downstream. Future challenges and areas of improvement are also presented.